ANNUAL REPORT

OF THE

Oregon Agricultural College

AND

Experiment Station

FOR THE YEAR ENDING

JUNE 30, 1899.

AGRICULTURAL COLLEGE PRINTING OFFICE.
GEO. B. KEADY, PRINTER.
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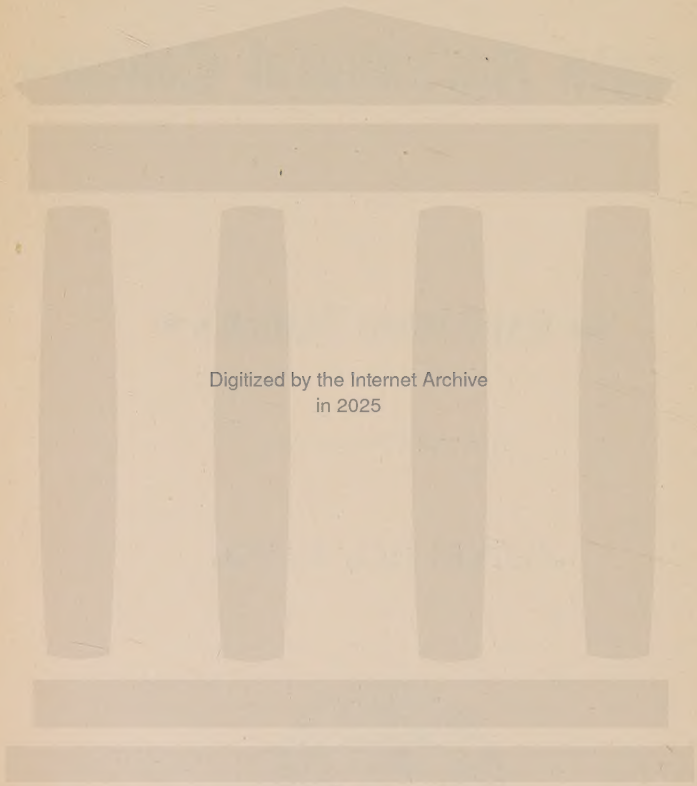

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ANNUAL REPORT

OF THE

OREGON AGRICULTURAL COLLEGE AND EXPERIMENT STATION, 1899.

REPORT OF THE PRESIDENT OF THE BOARD OF REGENTS.

To His Excellency, T. T. Geer, Governor of Oregon:

I have the honor of submitting to you this the thirtieth annual report of the Oregon Agricultural College and the tenth annual report of the work of the Experimental Station for the year ending June 30, 1899.

This has been one of the most prosperous years in the history of this institution. There has been a larger number of young men and women in attendance than was ever enrolled during any previous year. This closes the second year's work of Dr. Thomas M. Gatch as President of the college and Director of the station. I am gratified and pleased to be able to state that Dr. Gatch has continued to sustain ably and well the important work of this college and station. It is evident that he is the right man for this place. He has the cheerful co-operation and respect of the professors, teachers, and all employes. With the young men and women who have been in attendance during the year he is generally regarded as a father. His work in this school will remain a lasting monument of honor to him and of inestimable benefit to our people and to the State of Oregon.

Dr. James Withycombe as Vice-Director of the station was added to the station staff by the Board of Regents and upon resignation of Professor H. T. French, as Agriculturalist of the college, Dr. Withycombe was assigned to this work. He has proved himself as eminently qualified and competent to fully sustain and advance the work of the station and college, and is justly entitled to commendation for his faithful and good work.

Owing to the destruction by fire in September of the mechanical hall the entire work of the college was greatly embarassed for want of room to accommodate properly the large number of students in attendance. At the special session of the Legislative Assembly of the State of Oregon there was appropriated twenty-five thousand dollars for the purpose of replacing the buildings destroyed. Early in January there was completed a one story brick power house and blacksmith shop costing twenty-four hundred seventy-eight dollars and sixty cents ($2,478.60).

A new two-story stone building was contracted for and was to have been completed April first. The contractor was unable to complete this building within the time specified. It will soon be completed. Up to June 30, we had expended on this new building $14,105.35 leaving a balance of the special appropriation applicable for the completion of the mechanical hall $8,416.05. This elegant new building is well arranged and will accommodate a large number of students. It will be a credit to the people of this state and to this school. Its cost with the cost of the power house and blacksmith shop will not greatly exceed the amount appropriated. The money received from the insurance on the property destroyed by fire will be ample and adequate to meet the deficit on the cost of these buildings and also furnish them with improved modern machinery, implements and furniture. This branch of work at the college will be greatly improved.

With the money received from the State under the provisions of the act approved February 18, 1889, for the two years ending December 31, 1898, a commodious armory drill hall with physical culture rooms arranged for both women and men was constructed at a cost of $10,324.85. This building was completed in December and has greatly aided in accommodating the pupils who attend this school. This building was needed and will add to the comfort and culture of the young people who may attend this institution. From the money received from the State for the year ending December 31, 1899, under the provisions of the same act, the administration building has been cemented and repainted and other needed improvements thereon are being made and the armory and physical rooms will be furnished during the present vacation.

The late Legislative Assembly appropriated $19,336.00 for the purpose of providing a steam heating plant. There has been contracted for and it will be completed so as to be ready for the com-

mencement this fall—a heating plant for the administration building, chemical laboratory, horticulture building and the mechanical hall. It will not exceed the amount appropriated therefor. "Oregon's Great School" will be in a condition to maintain fully its good work and will accommodate at least two hundred and fifty more pupils than were enrolled last year.

Herewith I submit to you the report of the President of the college and the reports of the heads of departments of the college work for the year. Also the reports of the Director and Vice-Director and heads of experimental staff. In this connection I call your special attention to the fact that our reports have not been published—the omission has embarrased the managers of this institution. Our people should be able to know from year to year just what is being done at this public institution. The reports of like institutions of other States of this Union are published. We are often embarrassed in not being able to supply in exchange the reports of this state for the reports of other states. The Agricultural Department at Washington to whom we must account for the money received from the general government that is annually expended in the maintenance of the college and station want our published reports. We should have at least two hundred copies of these reports to enable us to supply in exchange with like institutions. In the interest of our people and in justice to those who have performed the work of this institution, I sincerely hope that these reports may be published. It would tend to relieve us from the charge often made that we are accomplishing nothing with the money expended.

I submit the following statement of money on hand July 1, 1898, of the several funds, amounts received, amounts disbursed and balances on hand June 30, 1899:—

EXPERIMENT STATION FUNDS.

July 1, 1898.	Balance on hand, local station fund		$ 1,237.31
June 30, 1899.	Amount received from sale of products		594.36
			$ 1,831.67
	Amount received, Hatch act		15,000.00
	Amount to be accounted for		$16.831.67
June 30, 1899.	By amount expended of Hatch fund	$15,000.00	
	By amount expended of local station fund	50.00	
	By balance on hand in local fund	1,781.67	
			$16,831.67

COLLEGE, MORRILL FUND, ACT OF 1890.

July 1, 1898.	Balance on hand	$ 16.18	
	Received during year	24,000.00	
			$24,016.18
June 30, 1899.	Amount expended of this fund	$22,484.63	
	Balance on hand	1,531-55	
			$24,016.18

STATE INTEREST FUND, ACT OF 1862.

July 1, 1898.	Balance on hand	$ 5,119.77	
June 30, 1899.	Received from the State	4,000.00	
			$ 9,119.77
	Amount expended		$ 9,119.77

SPECIAL STATE FUND, ACT OF 1889.

July 1, 1898.	Balance on hand	$ 4,870.35	
June 30, 1899.	Received for the two years ending December 31, 1899	10,000.00	
			$14,870.35
	Amount expended	$11,895.20	
	Balance on hand	2,975-15	
			$14,870.35

IMPROVEMENT FUND.

July 1, 1898.	Balance on hand	$ 950.00	
June 30, 1899.	Received from sales of farm products	813.83	
			$ 1,763.83
	Amount expended	$ 1,606.64	
	Balance on hand	157.19	
			$ 1,763.83

CHEMICAL BREAKAGE FUND.

July 1, 1898.	Balance on hand	$ 406.12	
June 30, 1899.	Amount received	321.45	
			$ 727.57
	Amount expended	$ 444.15	
	Balance on hand	283.42	
			$ 727.57

INSURANCE FUND.

June 30, 1899.	Received during the year	$17,072.57	
			$17,072.57
	Amount expended	$15,459.33	
	Balance on hand	1,613.24	
			$17,072.57

RECAPITULATION.

Balances on hand from last year and amounts received by the several funds for the year ending June 30, 1899 :—

Station fund	$16,831.67	
College (Morrill) fund	24,016.18	
State interest fund	9,119.77	
Special fund, act of 1889	14,870.35	
Improvement fund	1,763.83	
Chemical breakage fund	727.57	
Insurance fund	17,072.57	
		$84,401.94

Disbursements during the year:—

Station fund	$15,050 00	
College (Morrill) fund	22,484.63	
State interest fund	9,119.77	
Special fund, act of 1889	11,895.20	
Improvement fund	1,606.64	
Chemical breakage fund	444.15	
Insurance fund	15,459.33	
		$76,059.72

June 30, 1899. Balances on hand:—

Local station fund	$ 1,781.67	
College (Morrill) fund	1,531.55	
Special fund, act of 1889	2,975.15	
Improvement fund	157.19	
Chemical breakage fund	283.42	
Insurance fund	1,613.24	
		$ 8,342.22
Total to be accounted for		$84,401 94

There is a deficit of $2,226.78 against the state interest fund. The interest collected since January 1, 1899, in the State Treasurer's hands is applicable to meet this account. It will be ample to provide for this deficit and leave a balance applicable to meet for some time the expenses of the college chargable to this account.

I herewith submit a copy of the report of the Treasurer of this Board, showing in detail and fully accounting for all money coming into his hands as Treasurer of the Board.

In submitting this report it seems to me but just that I should express to you and to the Senators and Representatives of the Legislative Assembly my appreciation and thanks for the generous and liberal aid granted to this industrial school. It has enabled the board of managers of this institution to greatly improve the facilities for carrying on the important work. This year will mark a new period in the usefulness of this the peoples' school.

Respectfully submitted,

J. T. APPERSON,

President of the Board of Regents.

TREASURER'S REPORT.

1898-1899.

CORVALLIS, OREGON, July 19, 1899.

To the Board of Regents of the Agricultural College of Oregon:

GENTLEMEN:—Herewith I submit my annual report for the year ending June 30, 1899.

BALANCES ON HAND JULY 1, 1898.

State interest	$ 5,100.94	
Improvement	950.00	
Chemical breakage	406.12	
Miscellaneous	86.45	
Local station	1,237.31	
Special State	4,870.35	
		$12,651.17

INCOME FOR THE YEAR.

Station	$15,000.00	
College, Morrill	24,000.00	
State interest	4,000.00	
Farm products	1,408.19	
Chemical breakage	321.45	
Insurance, fire	17,072.57	
Mechanical hall	16,583.95	
		$88,386.16
Total		$101,037.33
Transfer checks		1,550.00
Second total		$102,587.33

DISBURSEMENTS BY FUNDS.

Station, Hatch	$15,000.00	
College, Morrill	22,484.63	
State interest	11,346.55	
Improvement	1,606.64	
Chemical breakage	444.15	
Local station	50.00	
Special, state	11,895.20	
Mechanical hall	16,593.95	
Insurance, fire	15,459.33	
	$94,870.45	
Transfer checks	1,550.00	96,420.45
Balance		$ 6,166.88
Less P. and L. on miscellaneous fund		51.44
Net balance		$ 6,115.44

BALANCES BY FUNDS.

Station	$	
College	1,531.55	
Improvement	157.19	
Chemical breakage	283.42	
Local station	1,781.67	
Insurance, fire	1,613.24	
Special, state	2,975.15	
		$8,342.22
State interest, deficit		2,226.78
Balance		$ 6,115.44

Appended to this report and made a part of the same is a transcript of all other checks drawn on the Treasurer during the year.

J. K. WEATHERFORD, Treasurer.

REPORT OF THE PRESIDENT.

To the Honorable Board of Regents of the Oregon Agricultural College:

GENTLEMEN:—I beg to submit my report for the collegiate year 1898–1899.

ATTENDANCE.

Exclusive of the farmers' short course, we have enrolled 338 students, only two more than were enrolled last year; or twenty-one more than were enrolled two years ago. The farmers' short course swells our number to 440 students in actual attendance, a much larger enrollment than that of any preceding year. Attendance by classes as follows:—

Freshmen	164	
Sophomores	79	
Juniors	30	
Seniors	36	
Graduates	15	
Special students	14	
		338
Farmers' short course		102
Grand total		440

ENGLISH.

Our college should forever remain as it is—emphatically, the farmers' school. To carry out this policy our requirements for admission should not be so high as to exclude graduates from the country schools. However excellent these schools may be, their graduates are often quite deficient in English, and through the entire college course this tells to their discredit. Our courses as now arranged require more English in proportion to other studies than is recommended by the Association of Agricultural Colleges. To remedy this trouble I recommend that a sub-freshman class be organized with the understanding that in addition to other studies, a constant drill in English be requirad throughout the year.

ASSAYING.

I suggest that assaying be introduced as an elective study. Prof. John F. Fulton is well qualified to conduct such a class as he paid special attention to this line of work last summer in Washington. I would hope that in a year or two this would lead to the establishment of a chair of Metallurgy and Mining Engineering. Professor Fulton could be prepared to take charge of such a department. Mining, as one of the great industries of Oregon, demands our attention.

EXPANSION.

Our college should be made the great industrial school of the Pacific coast. The farmers of Oregon would appreciate a school broadly planned and thoroughly equipped, and would give us a still more liberal patronage. Our agricultural department would share in the general prosperity of the school. With respect to the higher classics and a few other culture studies I would not dispute the claims of our State University, but industrial studies belong particularly to us.

PHARMACY.

In my last annual report I recommended the establishment of this department and the Board took action looking thereto. I am glad to say that the department has been quite successful. Twenty-six students are enrolled. The course has been approved by the State Board of Pharmacy. Although I knew that many land-grant colleges maintained such a department, yet fearing the Morrill funds could not be devoted to this purpose, I wrote the Commissioner of Education, and I beg to make his reply a part of this report:—

(*Copy.*)

DEPARTMENT OF THE INTERIOR.

BUREAU OF EDUCATION.

WASHINGTON, D. C., June 3, 1899.

Dr. Thomas M. Gatch, President, Oregon Agricultural College, Corvallis, Oregon:

DEAR SIR:—Your letter of May 29th asking whether funds received from the United States under either of the Morrill acts could be used in maintaining a course in pharmacy is received.

In reply thereto you are respectfully informed that the general government exercises no supervision whatsoever over the funds derived from the Act of Congress of July 2, 1862, but the disbursement thereof is left entirely in the hands of the several States. While the Act of August 30, 1890, restricts the expenditure of the funds authorized thereby to instruction in agriculture, the mechanic arts, the English language and the various branches of mathematical, physical, natural and economic sciences, pharmacy may be considered a specialized branch of both chemistry and botany, and instruction therein charged to the funds authorized by the said Act of August 30, 1890, and under the head of natural science.

Very respectfully,

(SIGNED:) W. T. HARRIS, Commissioner.

SALARIES.

Accompanying you will find a schedule of current salaries. Some of these could justly be increased.

The Regents have encouraged members of the Faculty to review their studies and take advanced work at other colleges and at the Department at Washington. In every case the instructor has brought back to his work here more enthusiasm and thoroughness. I am confident that our work is improving. We are not so willing as formerly to run in grooves and perpetuate our failings. The University of Wisconsin, the Agricultural College of Michigan and many other agricultural schools provide fine facilities for study and investigation during the summer months. The Department of Agriculture at Washington is always open to our professors. The Agricultural College of Iowa, at Ames, has a long vacation in winter and a regular term during summer. Members of our Faculty should not only be encouraged but should be required to study elsewhere, during the long summer vacation, at intervals of three or four years.

TABULATED STATEMENT.

With this report is a statement showing the classes, the number of students in each class, the time given to the class by the instructor and the whole number of hours for the entire year devoted by each instructor to recitations and lectures.

Respectfully submitted,

THOS. M. GATCH, President.

July 19, 1899.

OREGON AGRICULTURAL COLLEGE,

CORVALLIS, OREGON.

Report of the President of said institution to the Secretary of the Interior and the Secretary of Agriculture, as required by act of Congress of August 30, 1890, in aid of Colleges of Agriculture and the Mechanic Arts.

I. Condition and Progress of the Institution for the year ended June 30, 1899, especially—

(1) Changes in course or methods of instruction if of sufficient importance to warrant mention, and (2) purpose, structural character, and cost of new buildings or additions to buildings.

(2) An armory has been built costing $10,000. It is devoted primarily to military training. It is 70 feet by 120 feet, two stories. The basement story is of stone and has a commandant's room, a physical room for young ladies and one for young men, a bowling alley for both sexes. The second story is of wood and contains a drill hall, with armory rooms, and a running gallery. The usual drill room will be fitted for a gymnasium also. A mechanical hall, to be known as The Morrill Mechanical Hall, 120x80, has been completed, two stories, stone. It contains a woodworking room or shop, machine shop, printing office, drawing rooms, both free and mechanical drawing, physical laboratories and botanical room. It cost $21,000. A power house, including a blacksmith shop, one story, brick, costing $2,000, has been built. The engine rooms are supplied with boiler, engine, dynamos for furnishing power to the mechanical hall and printing office and for lighting the various buildings. A steam heating plant has been contracted for and will be ready for the fall opening. This will cost about $16,000.

II. Receipts for and During the year ended June 30, 1899.

1. Balance on hand July 1, 1899, over and above all indebtedness (excluding funded debt, if any)	$12,651.17
2. State aid: (*a*) Income from endowment granted by State	
(*b*) Appropriation for current expenses	
(*c*) Appropriations for building or for other special purposes	26,583.95
3. Federal aid: (*a*) Income from land grant, act of July 2, 1862	4,000.00
(*b*) Additional endowment act of August 30, 1890	24,000.00
(*c*) For experiment stations, act of March 2, 1887	15,000.00
4. Fees and all other sources	18,802.21
Total	$101,037.33

III. Expenditures for and During the year ended June 30, 1899.

1. Instruction in the subjects specified in sec. 1, act of August 30, 1890	$22,484.63
2. Instruction in all other subjects, if any, not mentioned in Question 1 of this series 3. Administrative expenses (President's, Secretary's, Treasurer's, Librarian's salary, clerical service, fuel, light, etc.)	11,346.55
4. Experiment Station	15,050.00
Total	$48,881.18

IV. Property, Year Ended June 30, 1899.

Value of all buildings, $92,000; of other equipment, $17,500.
Value of above property not used for instruction in the subjects specified in section 1 of act of August 30, 1890, buildings, $45,000; of other equipment, $10,500.
Total number of acres, 198.91; acres under cultivation, 125; acres used for experiments, 25; value of farm lands, $14,500; amount of all endowment funds, none.
Number of bound volumes, June 30, 1899, 4,000; pamphlets, unknown.

V. Faculty during the year ended June 30, 1899.

	MALE.	FEMALE.
1. College of Agriculture and Mechanic Arts:		
(*a*) Preparatory classes		
(*b*) Collegiate and special classes	19	5
(*c*) Total, counting none twice	19	5
2. Number in all other departments		
3. Number of staff of Experiment Station	11	

VI. Students during the year ended June 30, 1899.

	MALE.	FEMALE.
1. College of Agriculture and Mechanic Arts:		
(*a*) Preparatory classes		
(*b*) Collegiate and special classes	190	133
(*c*) Post Graduate courses	7	8
Total	197	141
2. Number in all other departments		

3. Number of students that pursued courses in agriculture, 51; mechanical engineering, 107; civil engineering, none; electrical engineering, 6; mining engineering, none; architecture, none; household economy, 132; veterinary science, none; dairying, none; military tactics, 190.
4. What degrees and how many of each kind were conferred in 1898-1899—
   On men—B. S. on 17 men.
   On women—B. S. on 17 women.
5. What and how many honorary degrees were conferred in 1898-1899, none.

(Signed:) THOS. M. GATCH, President.

By F. BERCHTOLD, Dean.

August 25, 1899.

REPORT OF THE DIRECTOR.

STATION.

To the Honorable Board of Regents of the Oregon Agricultural College and Experiment Station:

GENTLEMEN:—During the past year the work of the station has been under the immediate supervision of the Vice-Director, and to his report and the reports of other members of the council I must refer you for information in detail.

The work has made satisfactory advancement. In some lines it has surpassed that of preceding years.

In the last year's report these words occur: "Our Winter Short Course was but a repetition of the failure that has characterized every other attempt made by the college in this direction." It now

gives me great pleasure, by way of contrast, to state that our last short course was one of unqualified success. The members of the large class, coming together from all parts of the state, were interested, even enthusiastic, in their studies. We were greatly hampered for want of room, as our other classes could not be neglected. Any day we could hardly tell where we should meet the short course people; but no one complained, all seemed to be pleased.

The coming winter we can allot to the class a large lecture room for its special use, and in an adjoining room we can have several tables supplied with the best agricultural literature. We anticipate another successful season.

An increased interest is also manifest in our farmers' institutes.

It is gratifying to feel assured that no mistake was made in the selection of our Vice-Director.

Find accompanying a statement of account.

THOS. M. GATCH, Director.

July 19, 1899.

FINANCIAL ACCOUNT.

Oregon Agricultural Experiment Station, in account with United States Appropriation, 1898-1899.

DR.

To receipts from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1899, as per Act of Congress approved March 2, 1887	$15,000.00

CR.

By Salaries	$ 7 620.00	
Labor	3,124.01	
Publications	586.45	
Postage and stationery		
Freight and express	324.10	
Heat, light, and water		
Chemical supplies	589.72	
Seeds, plants, and sundry supplies	1,038.05	
Fertilizers	93.81	
Feeding stuffs	58.00	
Library	296.83	
Tools, implements, and machinery	550.00	
Furniture and fixtures		
Scientific apparatus		
Live stock	135.00	
Traveling expenses	532.30	
Contingent expenses	26.45	
Buildings and repairs	28.25	
Total		$15,000.00

SUPPLEMENTARY REPORT.

Local Station Fund.

Balance on hand July 1, 1899	$ 1,237.31	
Received from sales of farm products, etc	594.36	
		$ 1,831.67
Disbursed for building repairs	50.00	
Balance on hand		$ 1,781.67

REPORT OF THE VICE-DIRECTOR.

President Thos. M. Gatch, Director of the Agricultural Experiment Station:

SIR:—I have the honor to submit herewith the annual report of the department of agriculture accompanied by the subjoined annual reports of the experiment station chemist, horticulturist, entomologist, and bacteriologist for the year ending June 30, 1899.

FIELD WORK.

The labors of the respective departments of the station during the past year have been mainly spent along lines of such research work as would be capable of immediate practical application to the farm and orchard. Various problems, more or less serious in character, confront the farmer and orchardist. These problems differ in accordance with soil and climatic conditions of which we have at least two very distinct types within the borders of this state.

In the eastern portion of the state, the question of the conservation of moisture, of the maintenance of a desirable physical condition of wheat producing land, of the replenishment of ranges with nutritious grasses, and of irrigation, demand the immediate and serious attention of this station. At the present time wheat is being successfully grown in this portion of the state upon arid and semi-arid land without irrigation; but the method employed in the preparation of the land, while eminently satisfactory to the farmer at present, is, however, a temporary expedient only, and will ultimately terminate disastrously to the productiveness of the soil. The objectionable method is the summer fallow. This system of farming reduces the humus content of the soil through the rapid oxidation of the former, thus changing the physical character of the soil so as to render it less retentive of moisture. Although large areas of this section are yielding profitable crops of the cereals at present with normal precipitations, a continuation of this system will hasten the day when irrigation will be indispensable to the production of a crop.

In view of these conditions in this section of the state, an effort is being put forth by this station to solve these problems. A tract of land has been leased in a typical wheat area of Sherman county for the purpose of continuing a series of experiments in humus—

forming forage plants, and testing various methods of cultivation as to their ultimate effect upon soil moisture.

In western Oregon the conditions are favorable for the growing of grasses and leguminous plants, and the work of this department at the station has been mainly confined to the growth and consumption of these valuable nitrogen gathering forage plants with the intention of ascertaining their value as a rotation crop for the wheat areas of this portion of the state. For this purpose peas have been quite extensively grown this year. Some of these will be harvested by hogs, so that their value for food for this class of animals may be ascertained and the question of their economical production in lieu of the bare summer fallow determined. Vetches are also grown for the purpose of noting their effect upon wheat production and as an economical winter feed for sheep. We contemplate the feeding of a considerable quantity of this hay to sheep the coming winter to ascertain its value as a flesh former.

The matter of thin, medium, and thick seeding of wheat, also the depasturing of winter wheat with sheep has been taken up the past year and we hope to continue this work for a series of years.

TESTING OF VARIETIES.

The testing of varieties as practiced by this station for a number of years has been continued, and in addition to the large number of grasses and other forage plants previously introduced, many new varieties, especially of the annual leguminous class, have been added during the past year. This work, however, should be revised, and a large number of varieties eliminated that are of no economic importance. Only those indicating an adaptability to conditions found here should be perpetuated; while those dropped should be replaced from time to time with new varieties, the history of which will commend them for trial.

The growing of fiber producing plants has been dropped for the simple fact that it has been fully demonstrated that a good quality of flax and hemp can be grown in Oregon.

A number of new varieties of European hops have been introduced during the past year. The object for so doing is to find if possible varieties that will mature early and medium early so that the grower can secure them before the early fall rains begin. When found, such varieties are required to be rich in lupulin.

EXPERIMENT FEEDING.

This work in the past year has been confined to hogs and dairy cows. Nine hogs of the same breed and age, of nearly equal size, were divided into three lots. Lot one was fed on chopped wheat; lot two, chopped barley; lot three, chopped barley and cooked potatoes. For economical production of pork, the barley and potatoes proved to be slightly the best ration.

In connection with Professor F. L. Kent a rather novel experiment in the feeding and milking of cows was undertaken. Six cows were selected as near alike as possible, and of about the same period of lactation. These were divided into two lots, one of which was fed and milked regularly while the other lot was fed and milked irregularly. The two lots consumed practically the same amount of feed, but a net loss occurred with the lot irregularly fed and milked of approximately ten per cent. Another prominent feature of this experiment was the uniformity in the yield of butter fat. Hitherto it has been supposed that long intervals between milkings are responsible for lessening the per cent. of butter fat; but in this instance no appreciable variations occurred.

ANIMAL HUSBANDRY.

In addition to the Jersey herd previously established, a few choice Short Horns have been introduced as representatives of the beef type. These will be maintained for experiments in feeding, and for object lessons for the farmer and student.

A small but select flock of sheep, consisting of Cotswolds and Shropshires, has also been added to the live stock of the farm during the past year. This branch of animal husbandry is destined to be of inestimable value to the wheat grower. For the judicious handling of these animals in connection with a wise system of crop rotation will solve the problem of perpetuating the fertility of our wheat farms.

FARMERS' INSTITUTES.

This branch of educational work is worthy of encouragement. Probably but few systems afford better opportunities for acquainting the farmer with new methods in husbandry and the results of station work than that of the institute. At the meetings the interchanging of views is mutually beneficial to the farmer and scientist. The former secures scientific information upon topics of immediate in-

terest to him and is instructed in its practical application to the farm; while the latter is brought to realize more vividly the needs and perplexities of the farmer.

There is a growing demand for more institutes and while the station is ever ready and willing to accede to these demands, it is, however, becoming annually more difficult on the part of the station officials to fulfill these obligations, owing to the constant increase in the work of the station. Furthermore, there is no available fund at the station's disposal for this work. Hitherto the practice has been to defray the contingent expenses from the station fund, but this is construed by the Department at Washington as not being strictly in accordance with the spirit of the law. For the relief of this condition and for the further extension of this important branch of agricultural education, it is to be hoped that the state will make adequate provision.

Under the auspices of this college during the past year, farmers' institutes were held in the following counties: Benton, Clatsop, Douglas, Jackson, Josephine, Lane, Linn, Marion, Multnomah, Umatilla, Union, Wallowa, Washington, and Wasco.

FARMERS' SHORT COURSE.

It is gratifying to note the interest manifested by our farmers in this course and we hope to strengthen materially this branch of our work during the coming year.

This course is designed to meet the wants of agriculturists who cannot conveniently take a full college course in agriculture. Our aim is to impart to the student a large amount of thorougly practical information upon pertinent topics relating to general farming, as stock breeding and feeding; causes and treatment of the common diseases affecting farm animals; dairying, including butter making and cheese making, and the use of the Babcock test; gardening and fruit growing, etc. In fact every class of information calculated for the promotion and betterment of agriculture. The past year 102 students were enrolled in this course, representing 19 counties.

GENERAL WORK OF THE STATION.

This will be more specifically stated in the reports of the chiefs of the various departments. In addition to the work already in hand, there are many subjects of economic importance, that are worthy of immediate attention. Among these are problems in fruit evapora-

tion; cross-fertilization of fruits; the production of new varieties that will supply the requirements of the coming trade in the Orient, and which will be better suited to local conditions; observations in climatological effects on fruit polination; and investigations in soil bacteriology to determine if possible why clover fails to grow on some of the typical wheat land of western Oregon.

FINANCIAL STATEMENT.

Cash received during the year from sales of farm products, including stock	$533 31
Cash received during the year for dairy products	375 60
	$908 91

ACKNOWLEDGEMENTS.

I desire to acknowledge on the part of the station our obligations to the U. S. Department of Agriculture and Mr. A. B. Leckenby for a very liberal contribution of valuable seeds during the past year. Also desire to express to the managers of the Southern Pacific, and the Oregon Railway and Navigation Companies our keen appreciation of their generosity in granting transportation so liberally and thus enabling us to enlarge materially the scope of our field work.

We are under especial obligations to the press of the state for its cordial support and trust that the endeavors of the station will continue to merit this mark of esteem.

It seems proper in this connection to mention the donation by Hon. John B. Waldo to the station library of a very interesting volume on agriculture written by Marshall, 1774.

CONCLUSION.

In conclusion, Mr. Director, I desire to express my sincere appreciation for the cordial support received from all the members of the staff, and for the harmony of purpose, and faithfulness to duty among all of the members during the past year.

Very respectfully submitted,

JAMES WITHYCOMBE.

REPORT OF THE CHEMIST.

Dr. James Withycombe, Vice-Director of Oregon Experiment Station :

My Dear Sir: -I have the honor to submit the following report of work done in the chemical department of the station during the year ending June 30, 1899.

On account of the resignation of Mr. Frank E. Edwards as second assistant in the laboratory, during the first three months of the year, I was without regular assistance, Mr. Fulton being on leave of absence studying the subject of soil physics in the east.

It was September before a suitable man could be found to fill the vacancy made by Mr. Edwards' resignation, at the salary offered. Mr. C. M. McKellips, Ph. C., a graduate from Purdue University, was finally secured and has done most excellent work during the past year.

The work of the department has been conducted along the same general plan as in former years and is arranged in accordance with the following outline:

I. *Soils.*—(1) To acquire as much information as possible relative to the chemical characteristics of typical soil areas of the state.

(2) Also relative to the physical nature of these soil areas with particular reference to their moisture conditions.

(3) A study of the lime content of the Willamette valley soils and the effect of liming.

(4) A study of the alkali soils of eastern Oregon, together with an experiment in reclaiming such soils to determine the practicability of such work.

Fertilizers.—(5) A study of the effect of lime and potash separately and combined with other plant food (a) on worn soils, with special crops; (b) on prunes and cherries with the view of determining its effect on the size and quality of the fruit.

Fruit.—(6) General investigation as to the composition of Oregon fruits.

(7) Investigations as to the most favorable conditions under which prunes may be dried.

Miscellaneous.—(8) Relative merits of varieties of wheat and the effect of change of climate on composition of these wheats.

(9) Composition of Oregon forage plants and mill products.

(10) Experiments in growing sorghum for syrup making in southern and eastern Oregon.

(11) Digestion experiments with cattle foods.

(12) Investigations as to the relative composition and merits of Oregon and foreign hops, having in view the introduction of varieties richer in lupulin, tannin, and gum than those now grown here.

The above outline is of the regular lines of work in the chemical department. There is, however, more or less work of a very miscellaneous character which comes to us from various sources which is undertaken if the matter seems to be of public interest.

It must be understood that work under all these heads is not being conducted continuously at all times for the character of the work in hand at any particular time is in a measure dependent of the season of the year and the demands from class instruction. The various lines of investigation are advanced as fast as conditions will permit.

Within the limits of this report it will be impossible to discuss at any length the application of the results obtained in the analyses presented. Suffice it to say that with the exception of a few minor analyses the work here given fits into the scheme presented above and will be discussed at length in bulletin form at the proper time, and as rapidly as the facilities for publication will permit.

During the past year only a limited amount of time has been devoted purely to soil analysis. The work in this line has been mainly that of verification with the exception of such as had reference to alkali investigations in eastern Oregon which will be spoken of later.

Some attention has been paid to verifying observations on the acidity of soils which has resulted in confirming the data presented last year, viz., that at least 60 per cent of the soils of the Willamette valley are acid and need liming to enable them to do their best work. Every sample of red hill land so far examined has given an acid reaction. Particularly is this acidity true of a sample of the Waldo Hills soil recently examined.

We have verified the acidity of these soils—first mentioned in a report from this department two years ago—so often that there can no longer be any doubt of the fact. It now remains with the bacteriologist to demonstrate the best conditions for the growth of clover bacteria, and those of other plants in these soils.

Soils.—(2) Experiments as to the conservation of moisture in eastern Oregon soils are now being conducted in conjunction with the agricultural department, the moisture determinations being made in this department.

Soils.—(4) Experiments on the alkali soils of eastern Oregon were also begun this year. We were able to secure the co-operation of Mr. J. P. McMinn, of Milton, in this work. Mr. McMinn does all the work and furnishes the land without expense to the institution and works under our direction. The plat under experiment is one-half acre selected from a 32 acre field that will not produce any vegetation at all according to Mr. McMinn's statement. One half of the experimental plat is left in its natural state this year for experimenting with several kinds of crops to ascertain if a stand of any of them can be obtained. The other half was treated as follows: The plat was laid off into squares of 30 feet and at each corner a charge of powder was used sufficiently large to break up the underlying hard pan. A dressing of 500 pounds of gypsum was then given to the plat and the ground thoroughly cultivated, and subjected to treatment with water several times. If such ground can be reclaimed at a reasonable expense it means much to many farmers in eastern Oregon for it is permanently fertile and the richest soil in the state.

Analysis of the alkali from this field shows the active constituent of the alkali to be carbonate of soda constituting the so-called black alkali. One-tenth per cent of which is sufficient to prevent the growth of any crop. The following analysis shows the composition of the leachings from 100 grams of the surface salts:

Soda	5.1210
Potash	.1920
Iron and alumina	.2970
Phosphoric acid	.0768
Chlorin	.0280
Sulfuric acid	1.1060
Silica	.0605
Carbonic acid	3.1000
Total	10.5803
Insoluble in water	89.4197

Analyses from other spots show the alkali of this region of the state to be quite generally of the black form (carbonate of soda). Examination of samples from different depths taken at Athena show as follows:

	DEPTH TAKEN.	Soluble salts.	Alkaline carbonates in leachings.	Per cent of carbonates in soluble matter.	Per cent CO_2 in original soil.
1452	(a) 6 inches	19.30	15.10	.72	7.48
	(b) 12 inches	1.15	.51	.44	2.48
	(c) 18 inches	1.15	.34	.29	2.85
	(d) 24 inches	1.15	.17	.15	5.76
Hardpan	(e) 36 inches	-------	.17	-------	16.85

The above table shows the soluble salts to be much the strongest within the first six inches of the surface. It will also be noticed that the soluble carbonates, at a depth of 36 inches, are very slight, and that the insoluble carbonates as shown by the amount of carbonic acid present are excessively collected at that depth, which measures the depth to which the winter rains penetrate and thus form the hardpan by the cementing action of the lime carbonate present. The detailed results of these experiments will be published in bulletin form in due time. At the time of the writing of this report the report of Mr. McMinn on the condition of the plants at the present time is not at hand.

Experiment with Fertilizers, 5 (a).—A detailed plan of certain experimental plats located on the farm for the purpose of continued work in testing the effect of lime and potash on various crops was presented in the report of 1898. The plats last season were planted to potatoes more for the purpose of the cultivation which it was necessary to give, than for well defined results in yield, as this crop is known not to be very susceptible to the effect of lime. The season was not at all conducive to good results, so far as yield was concerned, which was very small indeed.

Potash on Prunes.—The experiments conducted with potash applied to prune trees was limited the past season to an experimental plat located west of the station on the orchard of Prof. E. B. McElroy. Experiments were begun both on Italians and Petites with the view of ascertaining the effect of potash salts on the size quality of the fruit. It is expected to continue this experiment several years before reporting any final results.

(6) Composition and Food Value of Oregon Fruits.—Such examinations of fruit are of value both from a scientific and practical standpoint, (1) giving a comparison of different varieties; (2) furnishing a point of departure for the development of other new varieties along desired lines; (3) contributing to our knowledge of

the average composition of the fruit; (4) and representing the degree of improvement over wild fruit.

(7) Conditions for Drying Fruit.—Under this head some experiments in dipping were conducted to ascertain the effect of dipping on small fruit. This was undertaken to determine if such fruit could be made to properly check by increasing the strength of lye used. The results showed that small prunes are not effected by the ordinary process of lye dipping and that increasing either the strength of solution or the time of keeping the fruit in the solution merely made the prunes crack deep into the flesh instead of properly checking. For a more detailed description of the results you are respectfully referred to Bulletin 56.

Brandy for Brown Rotted Prunes.—In the fall of 1898 an experiment was conducted to ascertain if it was possible to utilize prunes that were affected with "brown rot" for the manufacture of a saleable quality of brandy. The experiment was suggested very late in the season and the test was made only qualitatively.

Experiments were conducted (1) on prunes slightly affected with the disease, (2) on prunes very badly affected. In both cases the fruit gave a saleable quality of the product, but not one that would be called first class. The experiment showed that it is possible to manufacture this affected fruit into a usable quality of brandy—probably equal in quality to much that is on the market.

Cattle Foods.—But two alnalyses of cattle foods have been made during the past year. One (1513) of native hay from Union county and one of barley (1503) used in a feeding experiment conducted by the department of agriculture.

	Mixed native hay.		Barley.		Salsify.	
	Air dry.	Water free.	Air dry.	Water free.	Original substance.	Dry matter.
Moisture	8.75		11.21		77.07	
Dry matter	91.25		88 79		22.93	
Total	100.00	100.00	100.00	100.00	100.00	100.00
Fat	2.23	2.44	2.34	2.67	1.50	1.93
Albumenoids	11.25	12.21	10.19	11.47	3.21	4.16
Carbohydrates	36.79	40.45	67.98	76.56	17.82	23.10
Crude fiber	30.86	33.82	5.66	6.38		
Ash	10.12	11.08	2.62	2.95	.40	.51

Under the head of food stuffs may well be included several analyses of human foods which have been made in the chemical department the past year.

Sugar Beets.—During the past year there has been analyzed about 250 samples of sugar beets grown in the state, showing an average per cent of sugar of 15.12, and a purity of 85 per cent. An experiment was also conducted in the storing of beets in connection with Mr. Martin Winch of the Ladd & Reed farm. The results of the experiments in beet culture have been gone over and tabulated for the purpose of having all data more accessible and to contrast data for a bulletin that is in preparation which will show the final results in beet culture. It is expected to drop this line of work this year as the data in hand shows conclusively what localities are adapted to beet culture and which are not. The results show trials with varieties, harvesting at different dates, yield and sugar content on hill and bottom land, and the relation of sugar content and purity and weight of beet to the specific gravity of the juice.

There has been substituted for this line of work investigations in the growth of sorghum in eastern and southern Oregon for the purpose of syrup making. This was done as the industry is so closely related to that of sugar production, and the climatic conditions in each of these localities seem favorable to sorghum provided a sufficiently early maturing variety can be found.

Miscellaneous.—Under this head are included all such analyses as do not fall under one of the regular lines above named. There is an increasing demand on the department for a great variety of analyses and it is constantly a question as to what may be included in the regular work of the station. The policy adopted has been to include nothing which seemed to be of a purely personal nature.

ANALYSIS OF GYPSUM.

	1369	1370	1495	1496	1503	1291	1514
Insoluble residue	.....	.....	10.44	11.24	5.76	.18	.19
Pure crystalized gypsum	85.82	95.93	84.32	86.00	84.76	88.04	93.84
Lime carbonate, etc.	.....	.....	5.24	2.76	9.48	11.78	5.97
	.....	.....	100.00	100.00	100.00	100.00	100.00

Three of these samples, 1503, 1291, and 1514 are samples of Oregon gypsum and show that we have within our borders as pure gyp-

sum as can be found any where in the United States. Two others were from California and two from Japan; all, however, were on sale in Portland.

ANALYSIS OF LIMESTONE—OREGON.

	1528	1529	1530	1537
Calcium oxid (lime)	55.32	55.63	55.64	53.42
Insoluble matter	1.36	.96	1.31	4.00
Iron and alumni	Trace	Trace	Trace	.61
Magnesia	1.37	.16	.18	
Carbon dioxid	41.95	43.25	4 87	41.97
Total	100.00	100.00	100.00	100.00

The above are all samples of Oregon limestones. We have also named ten miscellaneous minerals for various parties, and one metallic incrustation.

Laurel Green.—An examination of a new insecticide called "laurel green" was made, which showed it to consist of copper, arsenic, lime, sulfuric acid, and carbonic acid. There were present:

Copper	9.92
Arsenic	7.80

Paris Greens.—Three determinations of arsenic in Paris green have been made as follows:

No. 1367	37.76
No. 1368	45.23
No. 1480	54.69

A sample of crematory ashes sent by Martin Winch, of Portland, was examined with the following results:

Moisture	8.89
Nitrogen	.38
Soluble Phosphoric Acid	Trace
Reverted Phosphoric Acid	.42
Insoluble Phosphoric Acid	1.60
Potash	.12

The following partial analyses of soils were made and sent from La Grande, by H. Cordes.

	1383. I	1484. II	1485. III
Lime	2.10	2.10	4.00
Phosphoric Acid	.02	.06	.06
Potash	.55	.54	.40
Nitrogen	.13	.15	.11

These soil analyses were made in connection with the development of the sugar beet seed experiments which are being conducted at La Grande.

Institutes. -During the year I have attended institutes at La Grande, Milton, The Dalles, Hood River, and Hebron, as well as a meeting of the State Dairy Association held in Portland.

Work for the State Food Commissioner.—During the year there have been analyzed for the State Dairy and Food Commissioner 3 samples of jelly, 2 samples of allspice, 4 samples of suspected butter and 3 samples of condensed milk.

Processed Butter.—During the year some time was spent in developing a method by which so-called "processed butter" could be identified with certainty. After considerable experimenting a method was found whereby this can be done, I believe, with absolute certainty. This work was rendered necessary on account of the fact that much of this material was being shipped from the east and was seriously underselling the genuine dairy butter and was a formidable competitor in appearance and otherwise. With this method I believe it will be possible to any sample of such goods. In the prosecution of this work 14 different samples of ordinary butters were examined besides the several samples of the spurious article.

Weather Bureau.—Observations for the weather bureau have been under the supervision of this department for the past year. Mr. E. J. Lea, a post graduate student in the department has had immediate charge of the work of making readings and observations. I desire to commend the faithfulness, neatness and despatch with which he has looked after the matter

Publications and Correspondence.—The publications of this department are: Bulletin 55—Composition of Cherries. Bulletin 56—Points on Prune Dipping and Alkalinity of Commercial Lyes.

The correspondence of the department has assumed considerable proportions. This may be considered significant and valuable in more ways than one. First, it indicates an interest in the work of the department throughout the state; second, it indicates a desire on the part of the people for the information they believe us able to communicate; third, it acquaints us with an innumerable number of facts and conditions which serve a valuable office in our work. While these inquiries often require no little time and labor to give the desired information, yet I believe this method of instruction to be laden with excellent results both to the public and to the station.

Respectfully submitted,

G. W. SHAW.

REPORT OF THE ENTOMOLOGIST.

To the Vice-Director:

SIR:—I hereby respectfully submit a brief report on the work of the department on entomology and plant diseases for the year ending June 30, 1899. The work of the department may be conveniently considered under the following heads:

1. A study of injurious insects.
2. A study of injurious fungi.
3. Spraying experiments and tests of other remedies.
4. Care of the collection.
5. Correspondence and publication.

INJURIOUS INSECTS.—At the beginning of the year it was thought best to select for investigation a comparatively few of the most important of the more than one hundred and fifty species of insects which have come under our observation during the last four years. Accordingly with the advice of yourself and the President the following list was prepared, a perusal of which will convey an idea of the scope of the work of the department:

1. The codling moth; continuation of observations on its habits, enemies and remedies.

2. Bark diseases. A study of their causes and prevention (new work).

3. The hop aphis. Observations on history and enemies. Experiment at spraying.

4. The prune root borer. Work to be continued.

5. The prune twig borer. Work nearly finished.

6. The green apple aphis. Work to be continued.

7. The wooly aphis. Work to be continued.

8. Strawberry pests. Continued work on Sesia rutilans, Anarsia sp. Phoxopteris comptana, Haltica (sp. ?) and leaf spot.

9. San Jose scale. Further experiments with fungus diseases.

10. Brown rot. Experimental spraying. New work.

11. The cucumber beetle. Study of distribution, food plants, life history and remedies. New work.

12. Pea weevil. Experimental spraying. New work.

13. Wheat pests. Hessian fly, joint worm, aphis, &c. New work.

14. Garden pests. Cabbage butterfly, cabbage plutella, root maggots, &c. New work.

15. Onion pests. Cut worm and thrips. New work.

16. Oregon grasshoppers.

17. Miscellaneous work with insecticides.

18. Breeding miscellaneous pests and recording observations on same.

19. Additions to the collection and rearrangement of same.

The codling moth, by reason of its importance as an apple pest, has received considerable attention. Much relating to its habits and to the methods of controlling it has been learned and the work is so promising that it is intended to make it one of the chief lines of work in the future. The prune twig miner, anarsia lineatella, which attracted so much attention during the seasons of 1896–97, and to a less extent in 1898, has this season done but little injury. Some work upon its habits has been done, however, and a bulletin upon this insect will be published during the year.

Perhaps the most important entomological event of the past year has been the unusual appearance in injurious numbers of various wheat insects. The wheat aphis was unusually abundant over a large part of the Willamette valley. At one place at least the joint worm which I think has not been before recorded from this state, did considerable injury; and worst of all, the Hessian fly, which had never been before reported from the state, has recently done considerable damage along the lower Columbia and in Tillamook county.

Among garden pests, it is worthy of note that the European cabbage butterfly has developed in injurious numbers in the state during the past year. It has undoubtedly been present for several years but has never before attracted attention as a serious pest. The cabbage plutella, which I think has never been recorded from the state, attracted considerable attention last year, as did also the root maggot, which works in cabbages, radishes, turnips, &c. The striped cucumber beetle has in the past two or three years become a serious pest to cucumbers, melons, squashes, beans and other garden vegetables, and a study of its history has occupied considerable of our attention.

Fungous Diseases.—Early in the year an arrangement was made with yourself and the botanist by which the department was to conduct the work in plant diseases. In accordance with this arrangement work was immediately begun upon brown rot, a disease which

during the past two years has done much injury to ripening prunes and peaches. A bulletin on this subject has recently been issued from the department.

We have also undertaken a study of the bark diseases variously known as "canker," "dead spot," &c. These diseases are among the most serious menaces to apple and prune growing, and we expect that in the near future we shall discover their nature and a reliable and satisfactory remedy for them.

During the year we have also succeeded in introducing a disease of the San Jose Scale which on a small scale has been quite efficient in destroying this pernicious pest. Cultures of the disease will be made and distributed to fruit growers living in the chief scale infected areas in the state.

Spraying Experiments.—Spraying experiments have been conducted this season on a more extensive scale than hitherto. Not only was the college orchard used but co-operative experiments were conducted in the orchards of Mr. J. B. Irvine, Mr. Rosé, Mr. Herzig and Mr. Thomas Whitehorn which were very courteously turned over to us for the purpose. The almost total failure of the apple and prune crop will render these experiments almost valueless so far as they are related to the codling moth and brown rot; but it is expected that they will furnish data relative to the efficiency of spraying in controlling leaf and bark diseases. Experiments in spraying for hop louse are under way and tests are being made of several proprietary spraying compounds, and of the effects of kerosene and of arsenic upon foliage.

Care of the Collection.—Several thousand specimens have been added to the collection which has now reached quite a respectable size. The Coleoptera have been entirely rearranged and the work of arranging the other orders will be completed as soon as possible.

Correspondence and Publications.—The correspondence of the department continues to increase and now forms no inconsiderable part of our labors particularly since the work in plant diseases has been transferred to this department.

In addition to the bulletin on brown rot previously mentioned we have furnished for publication a number of articles for the press through press bulletins and otherwise and contributed to the biennial report of the State Board of Horticulture an article on diseases of the prune.

As chairman of the short course committee we arranged the course of lectures, edited the advertising matter relating to it and delivered a course of ten lectures before the class. We also spent several weeks during the year in institute work.

Respectfully,
A. B. CORDLEY.

REPORT OF THE BOTANIST.

James Withycombe, Vice-Director:

DEAR SIR: —Herewith find a brief report of the condition of the work and equipment of this department for the year 1898-1899.

The outline of work as scheduled at the opening of the year has been followed as closely as conditions would permit. Referring to the scheme of work accompanying this report I may say of section I: The selection of seeds and stocks is being made from time to time as material becomes available. The season being cold and wet, and there being such a heavy loss of trees and fruit buds by the late February freeze, our work of pollinization has yielded returns with cherries only. Of these we have the fruits of ten crosses. A fairly good start for the work of breeding cherries, considering the prevailing conditions, climatically and otherwise, of the present year.

Of the introduction of new varieties, we have done little owing to the unsettled condition regarding the grounds about the greenhouse, which has heretofore been used for carrying on the work of the vegetable and small fruit section. Some half dozen or more varieties of pears, apples, cherries, and nuts have been planted to the east of the new orchard and, with the exception of a few trees, which were received in poor condition, all are doing well.

Of the ornamental trees and shrubs no purchases have been made. This is a feature of the work that should receive especial attention this fall. For the purpose of getting the plants well started in the nursery, before putting out on the campus, purchase should be made early. To meet the demand made by home builders for information as to what trees, shrubs and vines to plant, we should begin to make large test plantings of ornamentals, which could be made to do a double service by ornamenting the grounds.

As to section II: The work of collecting seeds and plants of our promising native herbs, shrubs and trees is being actively carried on during the present vacation months. As well as collecting and locating material myself, I have enlisted the support of several students on the work and anticipate a generous supply of material from this source. Numerous citizens have also expressed a determination to help by collecting local plants of interest and value.

Of section III: Little progress has been made, though the chemist, with whom the work is to be conducted conjointly, has procured apparatus for starting the preliminary work on prunes, there having been secured the use of a suitable evaporator space. The work of fruit preservation by jellying, fermentation, &c., is deemed of considerable importance, and it is only a matter of time till the station must undertake the investigation of methods and apparatus for the work. The horticulturists of the state have been asking for this work for the past ten years. With the next large crop they will demand information along these lines and the college should be prepared to meet their request.

In regard to the work of section IV: It may be said to be temporarily deferred. It is hoped that we may be enabled to co-operate with the voluntary weather observers next year.

Section V: Of the matter for bulletins I may say it is slowly accumulating. No special effort having been given to any particular phase of the work, the department is not prepared to promise publication of any matter at any date in the immediate future.

Of section VI: A limited amount of tests are being carried on as naturally follows from the orchard and garden plantings previously made.

Correspondence.—The correspondence of the department is a considerable part of its work, including as it does, the identification of fruits and plants, and the occasional elaborate discussions of cultural, varietal and scientific questions pertaining to orchard, garden and field crops.

Equipment.—To the botanical and forestal collections many hundred specimens have been added. No complete data have been kept as the work of the collecting season makes it impossible to number the specimens. The literature and apparatus added to the department during the past year have greatly increased the efficiency with which the work of the department may be done. A few hundred dollars more material along these lines will put the depart-

ment in condition for original work by regular and special students, as well as materially improving the work of the regular officers.

Other Work.—The natural outcome of a systematic scheme of investigations results in carrying along with it many subsidiary investigations. One of the most interesting ones at present being the test of relative values of root and top pruning in the planting of orchard trees. This work on a liberal scale is now inaugurated and it is hoped to enlarge it next spring.

Field Work by Students.—The indirect aid by students has been secured for the purpose of adding to the collection of seeds and plants. The requirements of the class-roon are made to co-operate with the needs of the department. Not only does the department need a full set of the plants of the state, but it also needs a full set, in fact several sets, of the seeds of its plants.

Field Work.—Original research in botany is best made at present, perhaps, through field collections. There is much systematic work to be done and as three or four lines of work can be carried on at the same time it is important that some weeks of the summer vacation be given to this work. As the work contemplated in the publication of a bulletin on our native trees and shrubs is largely to be done afield, e.g., the photography of the specimens; and as the selecting of the specimens for introduction into the collection; and the collection of rare buds, seeds, &c., are to be made in a similar manner, it is important that provision be made to carry on this work en masse at this time of the year.

Needed Equipment.—The department needs for station work alone (and at the same time such could be used without any inconvenience or abuse by the students) several pieces of apparatus and reference works, notably, laboratory glassware, gasfixtures for laboratory use, microscopic accessories, reference works.

1. The development of orchard, garden and ornamental varieties.
   a By selection of seed and stock.
   b By cross fertilization.
   c By the introduction of new varieties.
      1. Prunes; 2. Apples; 3. Pears; 4. Grapes; 5. Bush fruits; 6. Nuts; 7. Cherries; 8. Vegetables; 9. Flowering plants; 10. Ornamental plants, other than flowering plants.
2. The introduction and propagation of our promising native ornamental trees, shrubs and herbs.

3. Fruit preservation.
   a Cold storage.
      1. Dead air space; 2. Ice; 3. Night air.
   b Evaporation.
      1. Methods; 2. Machines; 3. Products; 4. Marketing.
   c Canning.
   d Preserving.
   e Jellying.
   f Fermentation.
      1. In fermented juices; 2. Vinegar; 3. Wine; 4. Brandy; 5. Alcohol.
4. Botanical survey.
   a Phenology.
   b Distribution of flora.
   c Enlargement of herbarium.
   d Arborescent flora and its importance to agriculture (forestry).
5. Bulletins—prospective.
   a Grapes.
   b Apples.
   c Pears.
   d Evaporation and equipment.
   e Nuts.
6. Testing relative merits of new and promising varieties of fruits, vegetables and flowers.

Respectfully submitted,

E. R. LAKE.

REPORT OF THE BACTERIOLOGIST.

To the Vice-Director:

DEAR SIR:—I herewith submit a condensed report of the work done in my department during the past year.

A considerable time was spent in studying a disease of a serious nature in goats. Owing to the great distance from the station, portions of the dead animal were not received until from three to four days after death; consequently the positive cause of the disease was not reached.

In the latter part of January, a disease broke out amongst the hogs at the asylum farm, killing sixty young hogs in about a week. The state veterinarian sent samples of the carcases to the station for diagnosis. A great many cultures were made from the germs noticed and pure cultures obtained; a hog was then inoculated with the culture producing death in fourteen days. Cultures were made from the hog and a rabbit was inoculated with this culture, dying in eight days. The post mortem examination of both the hog and the rabbit showed the characteristic leison of an acute form of hog cholera. Since my report to the proper authorities, the disease has again broken out in a chronic form at the same place. Every effort has been made and will be made to stamp out the disease.

In January a wool growers' convention convened in Pendleton for which I prepared and exhibited, with the stereopticon, sixty-four slides of single strands of wool photographed under the microscope showing the serrations in the wool from different breeds of sheep, goats, and cross-breed sheep. Slides were made showing the epithelial scales removed, and a single strand treated with acid to separate the fibro-cellular tissues illustrating the elasticity and tensile strength of the fiber. A fiber from each sample of wool was mounted and carefully measured before photographing. The series of slides comprehensively illustrates the effect upon the wool of cross-breeding sheep.

An experiment in raising clover on the different soils of the state was begun for the study of nitrifying organisms on the roots. The soil in many parts of the state gives an acid reaction and to neutralize this acid condition in a cheap and practical manner, clover seed was treated with lime; and some with a saturated solution of carbonate of soda containing a small amount of glue to make it adhere to the seed. So far, the latter method has proven very satisfactory because the seed carries with it a sufficient amount of alkali to neutralize the soil in the immediate vicinity of the young plant, stimulating the germ development. Seventy-five five-inch flower pots were used in the experiment. Next year field experiments will be conducted to verify the efficiency of these methods under natural conditions. The need of replenishing the soil with nitrogen through the activity of micro-organisms on the roots of leguminous crops, calls for attention and study, for it is nature's method of preserving fertility.

Samples of damaged wheat were sent to the station and by careful sectioning the kernels showed that the embryo had been totally destroyed by fungus (Tillitea caries), unfitting it for human food or for seed wheat. Cultures were made and the fungus classified.

An experiment was made in producing jelly from apples and other fruits without the use of sugar or other ingredients. One gallon of jelly of an excellent quality can be made from eight gallons of cider.

All the photographs, micrographs, lantern slides and engravings used by the station and the college during the past year were made, requiring much labor and time.

I also attended and illustrated lectures with a stereopticon at farmers' institutes in different parts of the state.

Respectfully submitted,

E. F. PERNOT.